

## **Vita - Frank Edward Moss**

**Date and place of Birth:** February 10, 1934, Paris Illinois

### **College and University Degrees:**

University of Virginia	B.E.E.	(Electrical Engineering)	1956
University of Virginia	M.N.E.	(Nuclear Engineering)	1961
University of Virginia	Ph.D.	(Physics)	1964

### ***Academic Experience- recent:***

Department of Physics, UMSL, Associate Professor of Physics	1971-76
Department of Physics, UMSL, Professor of Physics	1976-present
Department of Physics, UMSL, Curators' Professor	2000-present
Center for Neurodynamics, UMSL, Director	1996-2005

### ***Honors – recent:***

President's Award for Research and Creativity, University of Missouri System	1994
Elected to Fellowship in the American Physical Society Citation: “ <i>For elucidating the structure of turbulent superfluid helium and for the discovery of stochastic resonance in sensory biology.</i> ”	1996
Peter H. Raven Lifetime Award Awarded by the Academy of Science of St. Louis.	1999
Fellowship in the Academy of Science of St. Louis	1999
Senior Humboldt Prize for study and research in Germany	1999

### ***Editorial – recent:***

3. *Proceedings of the NATO Advanced Research Workshop on Stochastic Resonance in Physics and Biology*, San Diego, CA, April 1992  
Senior Editor: Frank Moss (co-edited with A. Bulsara and M. F. Shlesinger), special issue, *J. Stat. Phys.*, 70, 3/4 (1993).
4. *Handbook of Biological Physics*, Vol. 4, F. Moss and S. Gielen, eds., A. Hoff, general editor (Elsevier, Amsterdam, 2001)

5. *Focus issue on stochastic ratchets and stochastic resonance*, Guest editor (with R. Dean Astumian) *Chaos* Spring 1998.
6. *Fluctuations and Noise in Biological, Biophysical and Biomedical Systems*, S. M. Bezrukov, H. Frauenfelder and F. Moss, Eds. Proc. SPIE, Vol 5110 (Bellingham, WA 2003)

***Editorial Boards – recent:***

1. Associate Editor, *Physical Review E*, 1 January 1997 - 1999
2. Associate Editor, *Chaos*, 1 November 1997 - present
3. Editorial Board, *International Journal of Bifurcation & Chaos*, 1 January 1999 - present.

***Organization – Symposia, Conferences, and Workshops – recent:***

Co-Chair (with Dr. Sergey Bezrukov and Dr. Hans Frauenfelder) SPIE International Symposium on Fluctuations and Noise (FN-01), Santa Fe, NM June 2003.

Organizer, Workshop on Sensory Conduction, UMSL- Center for Neurodynamics, Dec. 2004.

Co-organizer (with, H. A. Braun, University of Marburg, Germany and Erik Mosekilde, Danish Technical University, Lyngby, Denmark) International Workshop “From Complex Systems Theory to Clinical Neurology”, Max-Planck-Institute for the Physics of Complex Systems, Dresden, Germany, 4-8 June 2007.

Co-Chair (with P. Tass, Research Center Juelich, Y. Maestrenko, Ukrainian Acad Sci and Juelich, and A. Pikovsky, Potsdam Univ. Germany) Nonlinear Dynamics, Chaos and Applications, International Workshop and School, Yalta, Crimea, Ukraine, May 2006

Organizer Symposium: “Life in Water at Low Reynolds Number” Nonlinear Dynamics, Chaos and Applications, International Workshop and School, Yalta, Crimea, Ukraine, May 2006

Co-organizer (with K. Showalter), Symposium on Collective Motions of Living and Nonliving Self-Propelled Particles, American Physical Society Meeting, March 2007

***Scientific Advisory Committee – Symposia, Conferences, and Workshops – recent:***

Biocomp2005, Vietri sul Mar, Italy, Dec 2005.

Conference on Unsolved Problems of Noise (UPoN) 2008, Lyon France, June 2008.

SPIE Conference on Fluctuations and Noise in 20-24 May 2007, La Pietra Conference Center, Florence, Italy May 2007.

International Conference on Neural Coding 2007, Montevideo, Uruguay September 2007.

***International Offices - recent:***

Scientific Advisory Board, *AGORA for Biosystems*, Sigtuna, Sweden, June 1998 – present

Science Programme Advisory Council for “Neuroscience”, Research Center Juelich, Juelich, Germany. 2005 – present. Resigned due to health, March 2007.

***External Appointments:***

Associate, Center of Excellence for Trauma Rehabilitation Research  
Dr. Faye Chiou-Tan, MD, Director  
Baylor College of Medicine  
Houston, TX 77004.....2001 – present

***Publications – recent:***

142. Sonya Bahar and Frank Moss, "Stochastic Phase Synchronization and Sensory Encoding: the Crayfish Mechanoreceptor/Photoreceptor System" *Chaos*, **13**,138-144 (2003)
143. G. Balazsi, A. Cornell-Bell, F. Moss, “Increased phase synchronization of spontaneous calcium oscillations in epileptic human versus normal rat astrocyte cultures.”, *Chaos* 13, 515-522 (2003)
144. G. Balazsi and F. Moss, “Stochastic Resonance: Examples from Sensory, Perceptive and Behavioral Neuroscience and Chemistry.” Invited review, *Nova Acta Leopoldina* NF 88, Nr. 332, 57 – 76 (2003) (Proc. German Academy of Science).
145. Anke Ordemann, G. Balazsi and F. Moss “Motions of Daphnia in a light field: Random walks with a zooplankton” *Nova Acta Leopoldina* NF 88, Nr. 332, 87 - 103 (2003) (Proc. German Academy of Science).
146. S. Bahar and F. Moss “The nonlinear dynamics of the crayfish mechanosensory system” invited review feature, *Intern. J. Bifurc. And Chaos*, 13, 2013-2034 (2003)
147. J. Mateos, A. Neiman and F. Moss, “Noise-induced walking patterns on ratchets” in *Unsolved Problems of Noise and Fluctuations*. S. Bezrukov, Ed., AIP Conference Proceedings, Vol. 665 (Melville, NY, 2003) pp 569-577
148. G. Balazsi, A. Ordemann, F. Moss, “Stochastic synchronization: Analogy with systems undergoing phase transitions” in *Unsolved Problems of Noise and Fluctuations*. S. Bezrukov, Ed., AIP Conference Proceedings, Vol. 665 (Melville, NY, 2003) pp 94-99.

149. A. Ordemann, G. Balazsi and F. Moss, "Pattern formation and stochastic motion of the zooplankton *Daphnia* in a light field" *Physica A*, 325, 260-266 (2003).
150. S. Bahar and F. Moss, "Stochastic Synchronization and Signal Rectification in the Crayfish Caudal Photoreceptor" in *Unsolved Problems of Noise and Fluctuations*. S. Bezrukov, Ed., AIP Conference Proceedings, Vol. 665 (Melville, NY, 2003) pp 173-180.
151. Bloodworth, Donna M. MD; Nguyen, Ben N. MD; Garver, Wayne MS; Moss, Frank PhD; Pedroza, Claudia PhD; Tran, Thao MD; Chiou-Tan, Faye Y. MD, "Comparison of Stochastic vs. Conventional Transcutaneous Electrical Stimulation for Pain Modulation in Patients with Electromyographically Documented Radiculopathy". *American Journal of Physical Medicine & Rehabilitation*. **83**(8):584-591, August 2004.
152. K. Dolan, A. Witt, J Kurths, and F. Moss, "Spatiotemporal distributions of unstable periodic orbits in noisy coupled chaotic systems" *Intern. J. Bifurc. & Chaos*, 13, 2673-2680 (2003).
153. F Moss and AB Neiman, "Thresholds and Noise", in: *Noise in Complex Systems and Stochastic Dynamics*, edited by L Schimansky-Geier, A Neiman, C Van den Broeck, SPIE Proceedings, Vol. 5114, pp. 201-208 (2003).
154. A. Ordemann, G. Balazsik, E. Caspari, F. Moss ; "Daphnia swarms: from single agent dynamics to collective vortex formation" in *Fluctuations and Noise in Biological, Biophysical and Biomredical Systems*, S. M. Bezrukov, H. Frauenfelder and F. Moss, Eds. SPIE Proceedings, Vol. 5110, Intern Soc. For Optical Engineering (Bellingham, WA 2003) pp172-179.
155. JL Mateos, AB Neiman, F Moss, J Fruend, L.Schimansky-Geier, and I Sokolov, "Walking on ratchets: a model of two Brownian motors with bistable coupling" in: *Noise in Complex Systems and Stochastic Dynamics*, edited by L Schimansky-Geier, A Neiman, C Van den Broeck, SPIE Proceedings Vol. 5114, pp. 20-31 (2003).
156. AB Neiman, DF Russell, F Moss, and L Schimansky-Geier, "Stochastic synchronization: applications to oscillatory electroreceptors", in: *Noise in Complex Systems and Stochastic Dynamics*, edited by L Schimansky-Geier, A Neiman, C Van den Broeck, SPIE Proceedings, Vol. 5114, pp. 239-248 (2003).
157. H. A. Braun, K. Voigt and F. Moss, Chaos in the Brain and in Sensory Neurons. *Appl. Nonlinear Dynamics* **11**, 77 – 83 (2003)
158. A. Neiman, D. F. Russell, F. Moss and L. Schimansky-Geier, Synchronization, Noise and Electroreceptors, *Appl. Nonlinear Dynamics* **11**, 84-94 (2003)

159. F. Moss, L. M. Ward, and W. G. Sannita, Stochastic resonance and sensory information processing: A tutorial and review of application. *Clinical Neurophysiol.* Vol 115/2 pp 267-281 (2004) Invited review.
160. Sonya Bahar and Frank Moss, Stochastic resonance and synchronization in the crayfish caudal photoreceptor. *Math. Biosci.* 188: 81-97, 2004.
161. Frank Moss, Into the *Daphnia* Vortex. Text and video, *Chaos*, **14**, S10 (2004). Listed in Dec. 1, 2004 issue of the *Virtual Journal of Biological Physics Research* <http://www.vjbio.org>.
162. Ricardo Garcia, Frank Moss, Ai Nihongi and J. Rudi Strickler, Are mean turning angles selected for survival of zooplankton? Proc. 4<sup>th</sup> Intern. Conference on Unsolved Problems of Noise, Lecce, Italy, June 2005. *American Institute of Physics, Conference Proceedings* Vol. 800 (AIP Press, New York, 2005) pp. 311-316
163. Ricardo Garcia, Frank Moss, Ai Nihongi, J. Rudi Strickler, Sebastian Göller, Udo Erdmann, Lutz Schimansky-Geier, Optimal foraging by zooplankton within patches: the case of *Daphnia*, *Math. Biosci.* (2007), doi:10.1016/j.mbs.2006.11.014 in press.

***Presentations (invited), Frank Moss – recent:***

170. “Noise sustained patterns in excitable systems”, Keynote talk, XVII International Botanical Congress, Vienna, Austria, July 2005.
171. “It all started with Robert Brown”, Intern. School of Solid State Physics: ‘100 years of Brownian Motion’, Erice, Italy July 2005
172. “Are turning angles of feeding zooplankton distributed for survival?” Summer School: Design and Control of Self-Organization in Physical, Chemical and Biological Systems. International Center for Theoretical Physics, Trieste, Italy, August 2005.
173. “Stochastic resonance and Stochastic synchronization: Applications in perception” Seminar, Neuroscience Training Program, Univ. Wisconsin-Madison, October 2005.
174. “Optimal Foraging by Zooplankton” Keynote lecture, Biocomp2005, Vietri sul Mar, Italy December 2005.
175. “From Brownian Motion to Foraging by Zooplankton: 178 years of inanimate and animate motions” Conference: “Nonlinear Dynamics, Chaos and Applications”, 15-26 May, 2006, Yalta in the Crimea, Ukraine. (Talk given by Dr. Udo Erdmann in my absence).

176. “Optimal Foraging by *Daphnia*” (with Ricardo Garcia) Workshop on Active Motion and Swarms, 4-6 December 2006, Institute of Physics, Humboldt University, Berlin, Germany.
177. “Optimal Foraging by the Zooplankton *Daphnia* and Noise Enhanced Fitness”, colloquium Department of Physics University of Padua, Padua, Italy February 14, 2007
178. “Darwin, Creation and Intelligent Design: what it’s like in the U. S.” seminar, Department of Physics University of Padua, Padua, Italy February 14, 2007.
179. “Optimal Foraging by *Daphnia*” (with Ricardo Garcia), Symposium on Individual and Collective Motion in Biology, SIAM Dynamical Systems Conference, 28 May – 1 June, 2007, Snowbird, Utah. (Talk to be given by U. Erdmann in my absence).